Environmental Implications of Transboundary Protected Areas and Matrix Lands

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Abstract

The North Cascades transboundary complex of parks and other protected areas (PPAs), together with a surrounding matrix of public and private lands, contains the upper watersheds of an important part of the Georgia Basin/Puget Sound region. This research aims to contribute to understanding how management policies and practices on these protected areas and surrounding lands affect natural ecological processes and the achievement of PPA objectives.

Key management issues include those that have high ecological influence, vary between land ownerships and jurisdictions (especially across the international boundary), and are currently undergoing development or refinement. This research initially focuses on three issues: fire management, reintroduction of animal species especially large predators, and regulation of human settlement.

As the pilot phase of a longer term project, this research:

(1) Compiles an inventory of PPAs and surrounding matrix areas in a part of the study region to test the approach.

(2) Categorizes and reviews management policies and practices, and environmental indicators.

(3) Examines links between management and the status of ecosystem processes.

(4) Identifies topics for further investigation.

Data are gathered by literature review, GIS data base compilation and analysis, and interviews with land managers and interest groups.

This paper is an initial report on a research project just getting underway. Presentation to the 2003 Georgia Basin/ Puget Sound Research Conference is an opportunity to expand awareness of the research, particularly among potential collaborators in Canada and others who can provide information on land use, policy, and other relevant topics on the Canadian side of the boundary.

The basic rationale for the project and the guiding assumptions behind it are that, firstly, protected areas, together with their surrounding matrix of private, mostly resource production lands, encompass the upper watersheds of the North Cascades transboundary region. Furthermore, management policies on this complex of protected areas and matrix lands greatly affect regional environmental quality and achievement of protected area objectives.

For this research, the North Cascades study region is broadly conceived, being preliminarily considered to include the area from highway US 2 in Washington state north through at least Manning Provincial Park in British Columbia. Protected areas in this region include federal, state, and provincial parks, forests, and recreation areas. State and provincial lands that are primarily used for timber harvest also can be considered protected areas under a broad definition based on protection from certain uses, such as conversion to residential or commercial use, although the environmental impacts of prevailing land uses here are quite different than in other categories of protected areas.

The model of cause/effect linkages guiding the project is depicted in Figure 1. We are ultimately interested in two subjects: the status of ecosystem processes in the region, and the status of the somewhat more specific ecological objectives of protected areas. Achievement of ecological objectives for protected areas (which usually are articulated in management plans) is determined by the status of broader, regional ecosystem processes. Both the status of ecosystem processes and the status of the more specific ecological objectives for protected areas can, we hope, be measured by environmental indicators of some kind.

Ecosystem processes themselves are affected by management practices on the ground, and by other influences beyond the control of management practices, for example: weather, infestation of pests or diseases, air pollution, or uncontrollable wildfire. Management practices, in turn, are determined by management policies and by other constraints such as economic conditions affecting budgets, fiscal policies, political pressure, and so on.

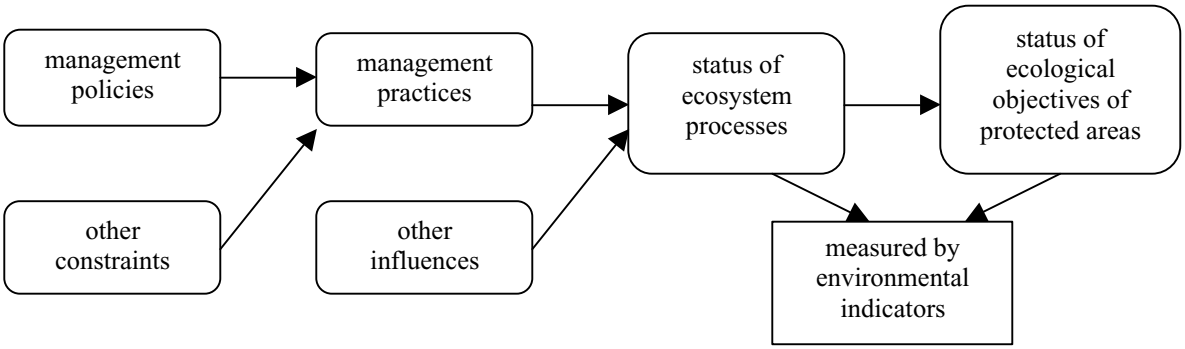

Figure 1. Model of Effects

Objectives for this research are of two kinds. First, the project is intended to produce information and insight on the following:

- The influence of management of upland protected areas on regional environmental quality.
- The influence of management of matrix lands on protected area objectives and on regional environmental quality.
- Links between land management policies and environmental quality (i.e., cause/effect relationships).
- More precise and in-depth indicators for protected areas and for ecological processes.

The second set of research objectives is educational. This project is intended to provide opportunities for graduate and undergraduate student research, and, through its activities and the materials compiled, strengthen the regional center at Huxley College, Western Washington University, for GIS data and analysis and for environmental policy analysis.

The following policies are of particular interest in examining impacts on ecological processes and protected area objectives:

- Management of large carnivores, in particular grizzly bears and wolves (e.g., reintroduction, hunting, habitat protection).
- Management of wildfire (suppression, prescribed fire, fuels management, etc.).
- Designation and management of wilderness.
- Regulation of human settlement, particularly residential and second-home development (e.g., zoning, provision of infrastructure).

These policies share the characteristics of having high ecological influence, varying between land ownership and jurisdiction categories (including across the international border), and currently undergoing development or refinement in a number of places.

Examples of research questions focused on these policies are the following:

- How are policies similar or different in adjacent transboundary protected areas?
- Can ecological effects of different protected area policies be discerned?
- How does management of surrounding matrix lands affect achievement of protected area ecological objectives?
- What are the effects on regional ecosystem processes of habitat management for large carnivores?
- What are the effects on regional ecosystem processes of expanding human settlement in matrix lands?
- How is fire management policy related to other ecosystem management policies and to land management objectives?
- How does management for wilderness affect regional ecosystem processes?

A major part of an effort to determine the status of ecosystem processes and the achievement of ecological objectives for protected areas must be to identify appropriate and practical indicators and devise methods for measuring them. Indicators such as Species at Risk, and Terrestrial Protected Areas (Transboundary Georgia Basin-Puget Sound Environmental Indicators Working Group, 2002), provide a general overview. More detailed and precise indicators will be needed to reflect ecological status in depth and for particular locales.

For this research, ecological process identified as being of particular interest include:

- Vegetation succession
- Natural biodiversity

- Community and population dynamics
- Wildlife movements
- Nutrient cycling
- Hydrological systems
- Functional wilderness
- Expanded and more focused indicators are needed to reflect the status of these processes.

The project intends to utilize Geographic Information System (GIS)-based data, together with analyses of management practices and policies from reports and interviews. GIS-based mapped data will include the status and spatial distribution of:

- Land ownership
- Protected area categories
- Land use
- Management policies
- Management practices
- Ecological processes
- Existing and derived environmental indicators

Region-wide databases of these parameters largely remain to be compiled. Individual land management agencies, such as—for the United States side of the border—the U.S. Forest Service, the National Park Service, and the Washington State Department of Natural Resources, have extensive GIS data for lands under their jurisdiction. Multiple-agency coverage is uncommon, as is inclusion of private lands. An early activity of this project is to expand the geographic and topical scope of a regional compilation of public land information prepared for a recent study of outdoor recreation in the Cascade foothills in Washington state (Allaway and Miles, 2001). Particularly needed as we develop this transboundary research project are GIS data sets and information on policies and land use practices for areas in Canada and areas spanning the international boundary.

References Cited

Allaway, J., and J. Miles, 2001. *A Future for Recreation: Report of the Cascade Foothills Recreation Study*. Washington State Parks Commission and Washington State Senate. 88 pp.

Transboundary Georgia Basin-Puget Sound Environmental Indicators Working Group, 2002. *Georgia Basin-Puget Sound Ecosystem Indicators Report*. Georgia Basin Ecosystem Initiative Publ. No. EC/GB-01-034; Washington State Dept. of Ecology Publ. No. 02-01-002. Environment Canada.